The Effect of Myofascial Release and Cervical Traction on Pain, Range of Motion and the Neck Disability Index in Patients with Chronic Neck Pain: A Randomized Controlled Trial

Ho-Yong Shin, PT, PhD

ABSTRACT

Purpose: This study examined the effects of the myofascial release and cervical traction after applying conservative physical therapy to patients chronic neck pain.

Methods: Patients were randomly divided into two groups, namely myofascial release (7 subjects) and cervical traction (7 subjects). Each group performed their therapy 45 minutes per day, two times a week, for four weeks. Pain intensity was measured using the visual analog scale (VAS). Function was measured with the neck disability index (NDI). The cervical range of motion (CROM) was measured with a cervical range of motion (CROM) goniometer.

Keywords: cervical traction, chronic neck pain, NDI, myofascial release, VAS.

Classification: NLM Code: WB460, WE755, WE141

Language: English

Great Britain Journals Press

LJP Copyright ID: 392845

The Effect of Myofascial Release and Cervical Traction on Pain, Range of Motion and the Neck Disability Index in Patients with Chronic Neck Pain: A Randomized Controlled Trial

Ho-Yong Shin, PT, PhD

ABSTRACT

Purpose: This study examined the effects of the myofascial release and cervical traction after applying conservative physical therapy to patients chronic neck pain.

Methods: Patients were randomly divided into two groups, namely myofascial release (7 subjects) and cervical traction (7 subjects). Each group performed their therapy 45 minutes per day, two times a week, for four weeks. Pain intensity was measured using the visual analog scale (VAS). Function was measured with the neck disability index (NDI). The cervical range of motion (CROM) was measured with a cervical range of motion (CROM) goniometer.

Results: After four weeks of therapy, the VAS ($p < .05$) and NDI ($p < .05$) significantly decreased, and ROM significantly increased in both groups ($p < .05$). There were also significant differences between the two groups for these three measures, except for neck flexion and neck extension ($p<.05$).

Conclusion: Myofascial release and cervical traction are more effective than cervical traction alone for reducing VAS and NDI and increasing ROM in patients with chronic neck pain.

Keywords: cervical traction, chronic neck pain, NDI, myofascial release, VAS.

Author: Department of Physical Therapy, Graduate School of Korea National of Transportation Department of Physical Therapy.

I. INTRODUCTION

Working on a computer and using a smartphone is essential for modern people, and smartphone usage among adults in South Korea has increased dramatically over the past decade, from 53% in 2012 to 97% in 2022 [1,2]. While the ubiquity of smart devices provides convenience, it is also a major contributor to the rise in musculoskeletal disorders[3]. According to the Korea Health Insurance Review and Assessment Service, one in three Koreans visited a medical institution in 2019 for musculoskeletal pain and dysfunction, and the number of people diagnosed with musculoskeletal disorders increased from 12.85 million in 2009 to 17.61 million in 2019[4]. Neck pain is one of the most diagnosed musculoskeletal conditions in the last decade, with 67% of people experiencing it at least once in their lifetime [4,5].

Neck pain is generally defined as pain and stiffness in the back and sides of the neck region between the superior nuchal line and the first spine [6,7]. This neck pain can cause decreased neck function, shoulder pain, headaches, and chronic fatigue that interfere with normal daily activities [8]. In addition, neck pain has a poor prognosis even after treatment and management, with a high likelihood of recurrence and often leading to chronicity [9]. Chronic neck pain is caused by a variety of factors, including physical, social, and psychological factors, although the exact and probable cause of tissue damage is unknown [10,11].

Variety of physical therapy interventions, including therapeutic modalities, manual therapy, and exercise therapy, which utilize heat, electricity, ultrasound, and mechanical forces to

reduce pain and improve function in patients with chronic neck pain, are widely used in clinical practice [1,12,13]. Of these, cervical traction is often used to treat patients with neck pain [14]. Cervical traction stretches the spinal structures, removing compression and irritation of the nerve roots to relieve pain, stabilizing the patient and reducing muscle spasms [15]. Borman et al [16] showed significant improvements in pain and Neck disability index (NDI) with cervical traction in patients with chronic neck pain, Chiu et al [17] showed improvements in pain and range of motion with cervical traction in patients with chronic neck pain, and Romeo et al [18] reported that cervical traction combined with manual therapy or other physical therapy interventions was more effective than traction alone in improving neck pain.

In recent years, it has become increasingly popular as a treatment for neck pain as it has been used in many countries to treat various musculoskeletal disorders [19-20]. Myofascial release is a commonly used manual therapy method in clinical practice that relaxes and normalizes fascia, muscle, and other tissues by applying compression, stretching, and other forces to the fascia, and is effective in reducing pain and improving joint range of motion [21-22]. Previous studies have reported that myofascial release is effective in improving neck range of motion and pain in patients with chronic neck pain by reducing adhesions in painful tissues and improving blood and lymph circulation [23], and myofascial release has been shown to significantly reduce pain in previous studies of patients with chronic neck pain. In addition, short-term studies of myofascial release in patients with chronic neck pain have shown improvements in pain and neck dysfunction index [24-25].

Although various interventions and treatments have been applied to patients with chronic neck pain, most studies have focused on patients with combined neck pain and other symptoms, making it difficult to objectively evaluate the intrinsic effectiveness of treatments for patients with chronic neck pain. In addition, although the effectiveness of myofascial release and cervical traction in the treatment of chronic neck pain has been demonstrated in several previous studies, there is a lack of research on the combination of myofascial release and cervical traction in the treatment of chronic neck pain.

Therefore, this study aimed to investigate the effects of myofascial release combined with cervical traction on pain, neck dysfunction index, and range of motion in patients with chronic neck pain, and to provide evidence for future clinicians or patients with chronic neck pain to utilize in the treatment and management of chronic neck pain.

II. METHODS

2.1 Subjects

This study was conducted on 14 patients with chronic neck pain who voluntarily participated in the study after being fully informed about the content, purpose and objectives of the study, experimental procedures, and safety of the study. The subjects were those who complained of neck pain for more than 12 weeks, had a Korean version of the Neck Disability Index (NDI) score of 5 or more, and excluded those who had undergone surgery in the neck area, had neurological diseases, received injection therapy within the last 2 months, or had a neck fracture. The 14 participants were randomly assigned to the experimental and control groups by lottery. The experimental group received 10 minutes of myofascial release, 10 minutes of neck traction, and 25 minutes of general physical therapy for 45 minutes twice a week for 4 weeks, while the control group received 10 minutes of neck traction and 35 minutes of general physical therapy for 45 minutes twice a week for 4 weeks.

2.2 Assessment

Visual Analogue Scale

In this study, a Visual Analog Scale (VAS) was used to assess pain. The VAS is a patient's subjective rating of pain on a scale of 0 to 100 mm, with 0 mm representing no perceived pain and 100 mm representing unbearable, excruciating pain. The VAS has been shown to have very high test-retest reliability of r=.99 and inter-rater reliability of r=1.00 [26].

Cervical Range of Motion

In this study, the CROM (performance attainment associates, MN, USA) was used to measure the range of motion of the neck during forward flexion, backward extension, side bending to the right and left, and right and left rotation. The two inclinometers on the forehead and next to the head are gravity inclinometers to measure flexion, extension, and side bending to the right and left, and the third inclinometer is a magnetic inclinometer to measure rotation, which can only measure the rotation of the head relative to a magnet fixed to the torso to exclude trunk movement. The subject is seated and the examiner fixes the subject's shoulders and measures 1) Neck flexion, 2) Neck extension, 3) Neck right side bending, 4) Neck left side bending, 5) right rotation, and 6) left rotation in the following order: 1) Neck flexion, 2) Neck extension, 3) Neck right side bending, 4) Neck left side bending, 5) right rotation, and 6) left rotation. The last range was measured while the subject was actively performing the movement and did not induce pain (Fig.1.). To reduce error, the test was performed three times, and the average of the three measurements was used after one practice without the protractor [27-28]. The reliability of the instrument was found to be ICC=.87 for flexion, ICC=.90 for extension, ICC=.92 for left side bending, ICC=.92 for right side bending, ICC=.90 for left rotation, and ICC=.94 for right rotation [29].

Neck Disability Index

In this study, the degree of functional limitations in daily life due to chronic neck pain was evaluated using the Korean version of the Neck Disability Index (NDI) [30]. The Neck Disability Index (NDI) is a 10-item questionnaire developed to measure neck pain and dysfunction, and consists of items such as pain intensity, daily activities, leisure activities, concentration, work, driving, and sleep. For each of the 10 items, patients are asked to select one of six possible responses ranging from 0 (no pain or no dysfunction) to 5 (intolerable pain or complete dysfunction) [31]. The NDI score is calculated by summing the scores for each item, dividing by the total score, and multiplying by 100, with higher NDI scores indicating greater functional impairment due to neck dysfunction [32]. In interpreting the results, the original developer, Vernon, suggested that a score of 4 or less indicates no disability, a score of 5 to 14 indicates mild disability, a score of 15 to 24 indicates moderate disability, a score of 25 to 34 indicates severe disability, and a score of 35 or more indicates complete disability [28]. The reliability of the instrument is ICC=.90 [30].

2.3 Treatment Methods

Myofascial Release

Myofascial release was applied to the upper trapezius, levator scapulae, sternocleidomastoid muscle, and Suboccipital muscles. The method was applied as shown in Figure 2 and lasted for 10 minutes.

Cervical Traction

The cervical traction device used for the intervention was the Auto Trac AT-5 (Auto Trac AT-5, DMC, KOREA), which is used with the patient sitting in a chair with the band secured to the chin and occipital bone area. The traction force was 1/10th of body weight, 6-10 kg, and intermittent traction was applied for 10 minutes with 10 seconds of traction followed by 10 seconds of traction at 15-20% of the traction force (Fig. 3.).

General Physical Therapy

Hot pack, ultrasound, and interference current therapy were used in the intervention as general physical therapy. The experimental group applied 10 minutes of hot packs, 5 minutes of ultrasound, and 10 minutes of interference current therapy, while the control group applied 15 minutes of hot packs, 5 minutes of ultrasound, and 15 minutes of interference current therapy by adding 5 minutes each of hot packs and interference current therapy to equalize the treatment time with the experimental group.

2.4 Data Analysis

Data processing for this study was performed using the IBM SPSS Statistics Win. 26 Subscription statistical program. Chi-squared test and independent t-test were used to test the homogeneity of the two groups. The Shapiro-wilk

test was used to test for normality, and the Wilcoxon signed ranks test was used to handle pre-post comparisons of the dependent variables by intervention within groups due to non-normal distribution, and the Mann-Whitney U test was used to compare the amount of change in the dependent variables by intervention between groups. All statistical significance was considered at $p < .05$.

IV. RESULTS

4.1 Subject Characteristics

There were 14 subjects in the study, 7 in the experimental group and 7 in the control group, and the homogeneity test for gender and age showed no statistically significant difference ($p > .05$) (Table 1.).

4.2 Effect of Treatment on VAS

The experimental group's VAS scores were significantly different in the pre- and post-intervention comparisons ($p < .05$). The VAS scores of the control group showed a significant difference in the pre- and post-intervention comparisons ($p < .05$). The between-group comparison of the experimental and control groups showed a statistically significant difference in VAS scores ($p < .05$) (Table 2.).

4.3 Effect of Treatment on CROM

Neck Flexion

The mean angle of neck flexion in the experimental group was significantly different in the pre- and post-intervention comparisons ($p < .05$). The mean angle of neck flexion in the control group was significantly different in the pre- and post-intervention comparisons ($p < .05$). There was no statistically significant difference ($p > .05$) in the mean neck flexion angle between the experimental and control groups (Table 3.).

Neck Extension

The experimental group's mean neck extension angle was significantly different in the pre- and post-intervention comparisons ($p < .05$). The pre-intervention mean neck extension angle of the control group was significantly different in the pre- and post-intervention comparison ($p < .05$). There was no statistically significant difference ($p > .05$) in the mean neck extension angle between the experimental and control groups (Table 3.).

Neck right side bending

The mean angle of the neck right side bending in the experimental group was significantly different in the pre- and post-intervention comparisons ($p < .05$). The mean angle of the neck right side bending of the control group was significantly different in the pre- and post-intervention comparison ($p < .05$). The between-group comparison of the experimental and control groups showed a statistically significant difference ($p < .05$) in the mean angle of the neck right side bending (Table 3.).

Neck left side bending

The mean angle of neck left side bending in the experimental group was significantly different in the pre- and post-intervention comparisons ($p < .05$). The mean angle of neck left side bending in the control group was significantly different in the pre- and post-intervention comparisons ($p < .05$). The between-group comparison of the experimental and control groups showed a statistically significant difference ($p < .05$) in the mean angle of neck left side bending (Table 3.).

Neck Right Rotation

The mean angle of neck right rotation in the experimental group was significantly different in the pre- and post-intervention comparisons ($p < .05$). The mean angle of neck right rotation in the control group was significantly different in the pre- and post-intervention comparisons ($p < .05$). The between-group comparison of the experimental and control groups showed a statistically significant difference ($p < .05$) in the mean angle of neck right rotation (Table 3.).

Neck Left Rotation

The experimental group's mean neck left rotation angle was significantly different in the pre- and post-intervention comparisons ($p < .05$). There was no significant difference between the pre- and post-intervention comparisons for the control group ($p > .05$). The between-group comparison between the experimental and control groups

showed a statistically significant difference ($p < .05$) in the mean angle of neck left rotation (Table 3.).

4.4 Effect of Treatment on NDI

The mean NDI scores of the experimental group were significantly different in the pre- and post-intervention comparisons ($p < .05$). The mean NDI scores of the control group were significantly different in the pre- and post-intervention comparisons ($p < .05$). The between-group comparison of the experimental and control groups showed a statistically significant difference in NDI scores ($p < .05$) (Table 4.).

IV. DISSCUSSION

This study was conducted to determine the changes in pain, function, and range of motion following neck traction and myofascial release in subjects with chronic neck pain. Patients with neck pain exhibit changes such as decreased neck joint mobility, decreased muscle strength and muscle endurance, muscle fiber contractures, and joint adhesions due to pain [33, 34]. If neck pain becomes chronic, it leads to changes such as decreased kinesthetic function due to loss of proprioception in the neck, persistent muscle tension and fatigue, and neuromuscular lesions and inhibition, which can lead to discomfort and restriction of daily activities and limited range of motion in the neck, causing psychosocial problems [8, 11, 35].

In this study, a VAS was used to measure pain in patients with chronic neck pain. Both the experimental and control groups showed a significant decrease in pain from pre- to post-treatment ($p < .05$). This is consistent with the results of Bae et al [3], who showed a significant difference in pain by applying myofascial release to patients with chronic neck pain, and Kim and Kim [15], who showed a significant difference in pain by applying neck traction to patients with neck pain, and it is believed that myofascial release and neck traction reduced pain by reducing adhesions in pain-causing tissues and relieving nerve root compression and irritation. The study also showed a greater improvement in pain in the experimental group with myofascial release and neck traction compared to the control group ($p < .05$). Savva et al[36] showed a significant difference in pain in the experimental group that applied neck traction and manual therapy together compared to the control group that applied neck traction alone, and these results are similar to the results of this study, which showed that the combination of manual therapy and neck traction was effective in improving pain.

Chronic neck pain impairs neck motion and limits the function of the neck joints, which in turn leads to physical changes such as decreased range of motion, muscle fiber atrophy, decreased adaptability, joint adhesions, and abnormal posture [37]. In this study, neck flexion, extension, right and left side bending, and right and left rotation were measured using a neck goniometer. In both the experimental and control groups, there was a significant increase in range of motion in neck flexion, extension, right and left side bending, and left rotation from pre- to post-experiment ($p < .05$), with right rotation being significantly increased only in the experimental group ($p < .05$). The results of this study are similar to those of Kim and Lee [23], who showed a significant increase in range of motion after applying myofascial release to the trapezius, upper trapezius, and posterior cervical spine in 15 patients for 4 weeks, and Hong and Kim [38], who showed a significant increase in range of motion after applying neck traction for 4 weeks. The study also showed a significant difference between the experimental group and the control group in side bending and rotation ($p < .05$). This suggests that myofascial release induced a vaso-fluidic response in the tight fascia and muscles and atrophied muscles in patients with neck pain, altering the proprioceptive mechanisms of soft tissue, and that the relaxation of fascia and muscle tension helped to restore range of motion [39], and these results are similar to those of Moustaf and Diab [40], who reported that neck traction combined with other physiotherapy treatments was more effective in

reducing neck pain, dysfunction, and range of motion than neck traction alone.

In this study, the NDI was used to assess function in patients with chronic neck pain. There was a significant decrease in NDI scores from pre- to post-test in both the experimental and control groups ($p < .05$). It has been reported that neck pain and the NDI, which assesses neck dysfunction, correlate with each other and affect daily functioning [41]. Manuel and Ivan [24,25] showed improvement in pain and NDI by applying myofascial release to patients with chronic neck pain, and Jeon Jae-guk and Kim Myung-joon [39] showed a significant reduction in pain and neck dysfunction index by applying myofascial release for 5 to 10 minutes per session twice a week for a total of 4 weeks. In addition, Fritz et al [43] showed a significant difference in NDI and pain in the combined exercise and mechanical traction group, which is similar to the results of this study. This study also showed a greater improvement in NDI scores in the experimental group with myofascial release and neck traction compared to the control group ($p < .05$), which is similar to the results of Young et al [44], who reported that neck traction is a good treatment, but combining manual therapy and exercise with neck traction treatment helps to relieve pain and function, which may be related to the more significant reduction in NDI in the experimental group.

A systematic review by Hidalgo et al [45] reported that the combination of manual therapies such as physical therapy and myofascial release was more effective than either of them alone for patients with neck pain. Therefore, the combination of myofascial release and neck traction for patients with chronic neck pain seems to be an effective intervention. However, this study is limited by the small number of subjects and the lack of follow-up after the intervention, which makes it difficult to confirm the persistence of the intervention effect. Future studies should take these limitations into consideration and consider different approaches to applying myofascial release and neck traction to patients with chronic neck pain.

V. CONCULSION

To compare the effectiveness of an intervention program for patients with chronic neck pain, this study assigned patients to myofascial release and neck traction (experimental group) or neck traction (control group) and measured changes in neck pain, range of motion, and neck dysfunction index before and after a 4-week intervention. The conclusions were as follows Both the experimental group with myofascial release and neck traction and the control group with neck traction alone showed improvement in pain, range of motion, and neck dysfunction, but the experimental group showed better improvement in pain, range of motion, and neck dysfunction compared to the control group. Based on the above results, it can be concluded that myofascial release and neck traction are effective in reducing pain, range of motion, and neck dysfunction in patients with chronic neck pain, and it is recommended that myofascial release and neck traction should be combined as a more effective intervention method in the treatment of patients with chronic neck pain.

REFERENCES

1. Jung SH, Park SS, Kwak DJ, et al. The effect of treatment method on neck pain, cervical range of motion and muscle activity of voluntary contraction in nonspecific neck patients. Journal of Sport and Leisure Studies. 2015; 62:873-82.
2. Korea Gallup. 2012-2022 Smartphone Usage Rate & Brands. Gallup report. G20220706.
3. Bae KY, Park SJ, Chon SC. Effects of application of myofascial release of neck and upper trunk on the pain, insomnia and sleep disturbances in patients with chronic neck pain. KSIM. 2021; 9(2): 43-52.
4. Health insurance review and assessment service. 2020.
5. Viljanen M, Malmivaara A, Uitti J, et al. Effectiveness of dynamic muscle training, relaxation training, or ordinary activity for chronic neck pain: randomised controlled trial. The BMJ. 2003;327; 1-5.
6. Ferrari R, Russell A. Neck pain. Best Pract Res Clin Rheumatol. 2003; 17(1): 57-70.

7. Misailidou V, Malliou P, Beneka A, et al. Assessment of patients with neck pain: a review of definitions, selection criteria, and measurement tools. J Chiropr Med. 2010; 9: 49-59.
8. Lin RF, Chang JJ, Lu ML. Correlations between quality of life and psychological factors in patients with chronic neck pain. Kaohsiung J Med Sci. 2010; 26(1): 13-20.
9. Kjellman G, Öberg B, Hensing G. A 12-year follow-up of subjects initially sicklisted with neck/shoulder or low back diagnoses. Physio Res Int. 2001;6(1): 52-63
10. Tozzi P, Bongiorno D, Vitturini C. Fascial release effects on patients with non-specific cervical or lumbar pain. J Bodyw Mov Ther. 2011; 15(4): 405-16.
11. Visser.B, Van Dieën JH. Pathophysiology of upper extremity muscle disorders. J Electromyogr Kinesiol. 2006;16:1-16.
12. Cheon SC, Jang KY. Effect of craniocervical flexion exercise on pain and cross sectional area of longus colli musclein workers with chronic neck pain. J Ergon Soc Korea. 2010; 29(6): 889-95.
13. Miller J, Gross A, D Sylva J, et al. Manual therapy and exercise for neck pain: A systematic review. Man Ther. 2010;15:334-54.
14. Revel M. Whiplash injury of the neck from concepts to facts. Ann Readapt Med Phys, 2003; 46(3): 158-170.
15. Kim SH, Kim MJ. The effect of cervical traction on pain & symptom for patients with cervical pain. Kor Acad Ortho Man Phys Ther. 2001; 7(1): 67-75.
16. Borman P, Keskin D, Ekici B, et al. The efficacy of intermittent cervical traction in patents with chronic neck pain. Clin Rheumatol. 2008; 27: 1249-53.
17. Chiu T, Joseph Kim-Ng J, Walter-Zheng B, et al. A randomized controlled trial on the efficacy of intermittent cervical traction for patients with chronic neck pain. Clinical Rehabilitation. 2010; 25(9): 814-22.
18. Romeo A, Vanti C, Boldrini V, et al. Cervical Radiculopathy: Effectiveness of Adding Traction to Physical Therapy-A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Phys Ther. 2019; 98(4): 231-42.
19. Lau H, Chiu T, Lam T. The effectiveness of thoracic manipulation on patients with chronic mechanical neck pain A randomized controlled trial. Man Ther. 2011;16:141-7.
20. Martel J, Dugas C, Dubois J, et al. A randomised controlled trial of preventive spinal manipulation with and without a home exercise program for patients with chronic neck pain. BMC Musculoskeletal Disorders. 2011; 12(41): 1471-84.
21. Alberto M, Angel O, Cleofas R, et al. Immediate changes in masticatory mechanosensitivity, mouth opening, and head posture after myofascial techniques in pain-free healthy participants: a randomized controlled trial. J MANIPULATIVE PHYSIOL THER. 2013; 36(5): 310-8.
22. Cha SW. Effects of posterior neck myofascial release therapy and massage therapy on muscles tension pain sleep and quality of life in casino workers. Nam Seoul University. Master Thesis. 2017.
23. Kim MG, Lee WJ. Effect of fascial distortion model on the pain and movement of neck patient. J Kor Phys Ther, 2019; 31(1): 24-30.
24. Manuel R, José L, Pablo R, et al. Effects of myofascial release on pressure pain thresholds in patients with neck pain: a single-blind randomized controlled trial. Am J Phys Med Rehabil. 2017 ;00(00):1-7.
25. Ivan R, Francisco J, Gustavo R, et al. Myofascial release therapy in the treatment of occupational mechanical neck pain: a randomized parallel group study. Am J Phys Med Rehabil. 2016; 00(00): 1-9.
26. Wagner DR, Tatsugawa K, Parker D, et al. Reliability and utility of a visual analog scale for the assessment of acute mountain sickness. High Alt Med Biol, 2007; 8(1): 27-31.
27. Park JS, Park DJ. Changes in the cervical and lumber flexion-relaxation ratio, range of motion, pressure pain threshold, and perceived comfort following the wearing of a trunk brace during smartphone watching. PNF & Mov. 2021; 19(3): 413-422.
28. Lee SM. The effect of pilates on craniovertebral angle, cervical range of

motion, neck and shoulder region pain and muscle fatigue on forward head posture. Pusan National University. Master Thesis. 2012.
29. Chae YW. The measurement of forward head posture and pressure pain threshold in neck muscle. J Kor Phys Ther. 2002; 14(1): 117-124.
30. Song KJ, Choi BW, Kim SJ, et al. Cross-cultural adaptation and validation of the korean version of the neck disability index. The Korean Fracture Society, 2009; 44(3): 350-359.
31. Lee EW, Shin WS, Jung KS, et al. Reliability and validity of the neck disability index in neck pain patient. PTK. 2007; 14(3): 97-106.
32. Trouli M, Vernon H, KakavelakisK, et al. Translation of the neck disability index and validation of the greek version in a sample of neck pain patients. BMC Musculoskeletal Disorders. 2009; 9(106): 1-8.
33. Hanten WP, Olson SL, Russell JL, et al. Total head excursion and resting head posture: normal and patient comparisons. Arch Phys Med Rehabil. 2000; 81(1): 62-66.
34. Lee H, Nicholson LL, Adams RD. Cervical range of motion associations with subclinical neck pain. Spine. 2004; 29(1): 33-40.
35. Stovner LJ, Hagen K, Jensen R. The global burden of headache: a documentation of headache preva-lence and disability world-wide. Cephalalgia 2007; 27: 193-210.
36. Savva C, Korakakis V, Efstathiou M, et al. Cervical traction combined with neural mobilization for patients with cervical radiculopathy: A randomized controlled trial. J Bodyw Mov Ther. 2020; 26: 279-89.
37. Lee HJ, Leslie L. Nicholson, Roger D. Cervical range of motion associations with subclinical neck pain. Spine. 2003; 1(1): 43-57.
38. Hong JG, Kim YM. Effects of Cervical traction and Muscle Energy Technique on Pain, Neck Disability Index, Function, Range of Motion in Patients with Cervical Radiculopathy. Kor Acad Ortho Man Phys Ther. 2021; 27(3): 57-67.
39. Hakkinen A, Salo P, Tarvainen U, et al. Effect of manual therapy and stretching on neck muscle strength and mobility in chronic neck pain. J Rehabil Med Clin Commun. 2007; 39: 575-79
40. Moustafa IM, Diab AA. Multimodal treatment program comparing 2 different traction approaches for patients with discogenic cervical radiculopathy: A randomized controlled trial. J Chiropr Med. 2014; 13(3): 157-167.
41. García-Pérez-Juana D, Fernández- de- Las-Peñas C, Arias-Buría JL. Changes in cervi-cocephalic kinesthetic sensibility, widespread pressure pain sensitivity, and neck pain after cervical thrust manipulation in patients with chronic mechanical neck pain: a randomized clinical trial. J Manipulative Physiol Ther. 2018; 41(7): 551-560.
42. Jeon JK, Kim MJ. Effects of myofacial release and mulligan technique on pain and disability for cervicogenic headache patients. Kor Acad Ortho Man Phys Ther. 2012; 18(2): 87-93.
43. Fritz JM, Thackeray A, Brennan GP, et al. Exercise only, exercise with mechanical traction, or exercise with over-door traction for patients with cervical radiculopathy, with or without consideration of status on a previously described subgrouping rule: a randomized clinical trial. J Orthop Sports Phys Ther. 2014; 44(2): 45-57
44. Young IA, Michener LA, Cleland JA, et al. Manual therapy, exercise, and traction for patients with cervical radiculopathy: a randomized clinical trial. Phys Ther. 2009; 89(7): 632-642.
45. Hidalgo B, Halld T, Bossert, J, et al. The efficacy of manual therapy and exercise for treating non-specific neck pain: a systematic review. J Back Musculoskelet Rehabil. 2017; 30: 1149-1169.

Table 1: General Characteristics of all the Subjects

Variables	EG (n=7)	CG (n=7)	χ^2/t(p)
Gender (M/F)	3/4	4/3	.500(.626)
Age (yrs)	42.28±17.63[a]	43.00±10.59	-.092(.928)

M: Male, F: Female EG: Group that applied Myofascial release, Cervical traction and Preservation Physical Therapy, CG: Group that applied Cervical traction Preservation Physical Therapy, [a]Mean (㎜)±SD

Table 2: Comparison of Visual Analog Scale values between the Experimental and Control Groups (unit: score)

VAS	EG (n=7)	CG (n=7)	z	p
Pre	5.71±1.38[a]	5.00±1.15		
Post	3.42±1.71	4.00±0.81		
Diff	-2.28±0.75	-1.00±0.81	-2.660	.007*
z	-2.401	-2.070		
p	.016*	.038*		

[a]Mean (㎜)±SD, VAS: Visual Analogue Scale, EG: Group that applied Myofascial release, Cervical traction, and Preservation Physical Therapy, CG: Group that applied Cervical traction Preservation Physical Therapy, * : p < .05

Table 3: The Comparison of the Neck Range of Motion Angle Values Between the Experimental and Control Groups (Unit: °)

		EG (n=7)	CG (n=7)	z	p
NF	Pre	40.14±3.43[a]	36.42±3.15		
	Post	43.14±2.34	40.42±2.50		
	Diff	3.00±1.91	4.00±2.23	-.846	.456
	z	-2.214	-2.226		
	p	.027*	.026*		
NE	Pre	36.14±5.95	38.28±3.45		
	Post	39.42±2.87	42.14±3.13		
	Diff	3.28±3.55	3.86±1.57	-.388	.710
	z	-2.023	-2.384		
	p	.043*	.017*		
NRB	Pre	28.00±4.32	30.28±2.98		
	Post	36.00±3.91	32.71±2.81		
	Diff	8.00±3.82	2.43±0.97	-2.528	.011*
	z	-2.371	-2.388		
	p	.018*	.017*		
NLB	Pre	29.14±2.73	29.57±3.30		

	Post	34.28±3.77	32.00±2.38		
	Diff	5.14±1.34	2.42±2.29	-2.074	.038*
	z	-2.375	-2.226		
	p	.018*	.026*		
	Pre	47.14±6.89	46.00±6.21		
	Post	53.14±6.06	49.00±4.79		
NRR	Diff	6.00±2.16	3.00±2.00	-2.404	.017*
	z	-2.410	-2.214		
	p	.018*	.027*		
	Pre	46.28±7.38	46.42±6.39		
	Post	53.57±5.41	47.71±5.76		
NLR	Diff	7.29±3.89	1.29±2.28	-2.505	.011*
	z	-2.207	-1.380		
	p	.027*	.168		

[a]Mean (㎜)±SD, NF: neck flexion, NE: neck extension, NRB: neck right side bending, NLB: neck left side bending, NRR: neck right rotation, NLR: neck left rotation, EG: Group that applied Myofascial release, Cervical traction, and Preservation Physical Therapy, CG: Group that applied Cervical traction Preservation Physical Therapy, * : p < .05

Table 4: Comparison of the NDI values between the Experimental and Control Groups (unit: score)

NDI	EG (n=7)	CG (n=7)	z	p
Pre	18.85±5.33[a]	18.14±4.22		
Post	12.85±2.73	15.71±3.72		
Diff	-6.00±2.50	-2.42±0.78	2.849	.004*
z	-2.388	-2.456		
p	.017*	.014*		

[a]Mean(㎜)±SD, NDI: Neck Disability Index, EG: Group that applied Myofascial release, Cervical traction, and Preservation Physical Therapy, CG: Group that applied Cervical traction Preservation Physical Therapy, * : p < .05

Fig. 1: Cervical Range of Motion (CROM)

	Content	Photo
Upper trapezius myofascial release	With the patient in an upright position, the therapist's hands are crossed, with one hand on the nuchal ligament and the other on the acromion and the therapist gently compresses and then gently extends while holding the compression for 90 to 120 seconds.	
Levator scapulae myofascial release	With the patient in the upright position and the patient's head turned, the therapist applies and maintains to the transverse process of C1 and drives toward the superior angle of the shoulder blade for 90 to 120 seconds.	
Sternocleido mastoid myofascial release	With the patient in the upright position, the therapist palpates the cervical spine with the patient's head turned, gently compresses the cervical spine, and holds the compression while slowly traveling from the cervical spine toward the clavicle and sternum for 90 to 120 seconds.	
Suboccipital myofascial release	With the patient in an upright position, the therapist supports the patient's head with the palms of both hands and uses the tips of the index to ring fingers to gently compress the suboccipital region of the back of the head for 90 to 120 seconds, followed by a gentle pull toward the therapist for 60 seconds.	

Fig. 2: Myofascial Release

Fig. 3: Cervical Traction